

Original Research Article

Management of adhesive capsulitis of shoulder joint with arthroscopic release vs. manipulation under anaesthesia: a comparative study

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ABSTRACT

Background: Shoulder stiffness is a manifestation of various pathologies or clinical scenarios variously described as scapula humeral peri-arthritis, frozen shoulder and adhesive capsulitis. Frozen shoulder is characterized by significant restriction of active and passive motion of the shoulder that occurs due to unknown factors. Adhesive capsulitis causes contracted, thickened joint capsule that seemed to be drawn tightly around the humeral head with a relative absence of synovial fluid and chronic inflammatory changes within the subsynovial layer of the capsule. In this study we did a comparison of 30 patients treated with arthroscopic release and manipulation under anesthesia.

Methods: There were 30 patients in this study with 15 patients in each group of different age groups. All the patients were studied for a period of one year between July 2021 to July 2022. The functional outcomes were assessed using dash scoring system.

Results: in this study of 30 patients with different age groups followed for 12 months and assessed by DASH scoring system. We had excellent results in arthroscopic group with postop dash score standard deviation is 5.87.

Conclusions: The arthroscopic capsular release of shoulder joint in adhesive capsulitis was found to have a better functional outcome as compared to the manipulation of shoulder joint under anaesthesia. Currently no treatment protocols are universally effective which needs more and more research and developments for proper treatment strategies. Morbidity with this condition has caused significant loss both economically and psychologically.

Keywords: Adhesive capsulitis, Arthroscopic release, Dash scoring system

INTRODUCTION

Shoulder stiffness is a manifestation of various pathologies. In the past, it has been variously described as scapula humeral peri-arthritis, frozen shoulder and adhesive capsulitis. Frozen shoulder is characterized by significant restriction of active and passive motion of the shoulder that occurs due to unknown factors. Adhesive capsulitis is a contracted, thickened joint capsule that seemed to be drawn tightly around the humeral head with a relative absence of synovial fluid and chronic

inflammatory changes within the sub synovial layer of the capsule. Cytokines, metallo-proteinases, and growth factor beta 1 have been implicated in the process. Hyperlipidemia also has been proposed as a risk factor for primary frozen shoulder. Increased expression of nerve growth factor receptor and new nerve fibers found in the shoulder capsular tissue of patients with frozen shoulder suggest that neo innervation and neo angiogenesis in the capsule are important events in the pathogenesis of frozen shoulder and may help explain the often-severe pain in patients with this condition. Inadequate glycemic control as measured

by the glycosylated hemoglobin A1c (HbA1c) level can identify diabetic patients who are at higher risk for developing frozen shoulder.¹⁻³ In a series of 1150 diabetic patients with frozen shoulder, no association was found between HbA1c level and the occurrence of frozen shoulder.^{4,5} The incidence of frozen shoulder in the general population is approximately 2%, but several conditions are associated with an increased incidence.⁶ Factors like female gender, age older than 50 years, diabetes mellitus, cervical disc disease, prolonged immobilization, hyperthyroidism, stroke or myocardial infarction, the presence of autoimmune diseases, and trauma. Lundberg developed a classification system of frozen shoulder based on the presence or absence of an inciting event. Most patients can internally rotate only to the sacrum, have 50% loss of external rotation, and have less than 90 degrees of abduction.

Aim and objectives

Aim and objectives of current study was to directly compare outcomes of patients with adhesive capsulitis who have failed pain management and failed improvement in range of motion after a least 3 months of supervised, regimented conservative treatment and have subsequently been randomized to either closed manipulation under anaesthesia or arthroscopic capsular release. Objectives were to evaluate the results of surgical management of adhesive capsulitis shoulder joint with arthroscopic release vs manipulation under anaesthesia and to follow up the patients treated and note the functional outcome.

METHODS

Current study was a comparative clinical study. Purpose of the study is to analyze the comparative study of surgical Management of adhesive capsulitis of shoulder Joint with arthroscopic release VS manipulation under anaesthesia. Data collection is done as per the proforma with consent from the patients admitted at Dr. Patnam Mahender Reddy Institute of Medical Sciences, Chevella. Period of the study is 1 year July 2021 to July 2022 with Sample size of 30 cases were taken up for our study with 15 cases in each group ANS scores were assessed by DASH Scoring system;

$$\text{Formula} = \left(\frac{\text{sum of } n \text{ responses}}{n} \right) - 1$$

Where *n* represents the number of completed items.

Inclusion criteria

Patients must be diagnosed as having idiopathic adhesive capsulitis in the 'frozen' or 'thawing' phase of disease and have tried and failed at least 3 months of nonoperative therapy or patient with adhesive capsulitis who presents already in the 'frozen' or 'thawing' phase who demands a quicker return to function and will not try 3 months of nonoperative therapy first.

Exclusion criteria

Patients with same side rotator cuff tear, glenohumeral osteoarthritis, calcific tendonitis, impingement, osteonecrosis, neoplasm, cervical radiculopathy are excluded. Patients who are medically unfit to undergo a general anaesthesia and who are unable to comply with the post-operative protocol are not included in this study.

Instruments used

Arthroscope with angle of inclination is the angle between the axis of 25 and 30-degree arthroscopes are most commonly used. Fibre optic light source. Probe with right-angled and tip size of 3mm. Motorized shaving system with hollow cannula and an inner rotating cannula with fenestration of the tip. A equipment tower comprising a video monitor, light source, shaver power source, video recorder and irrigation pump is positioned opposite the surgeon. Arthroscopic pump. Radiofrequency cold ablation used for controlling bleeding; Bipolar RF probe.

Pre-operative assessment

Assessment of shoulder range of movements, Stiffness of shoulder joint for 3 months to 6 months. More than 50% loss of external rotation & abduction. Limitation of movements around 30° less in 2 or more planes. Normal X-rays and MRI are advised for assessing inferior glenohumeral ligament measurement in adhesive capsulitis the axillary recess may show thickening up to 1.3 cm or more, the joint capsule is also thickened. Classical sub coracoid triangle sign is seen in sagittal oblique T1 weighted images.

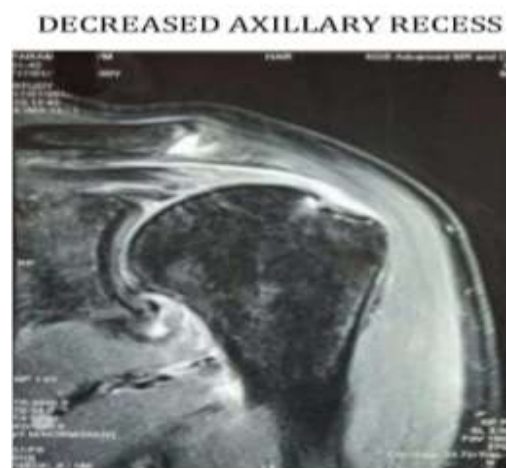


Figure 1: MRI image.

Operative procedure

Patients are in lateral position under long-acting regional anaesthesia in combination with general anaesthesia. Passive range of motion was assessed under anaesthesia without manipulation and glenohumeral joint was

insufflated with saline with an 18-gauge spinal needle from the posterior approach. The humeral head was tightly opposed to the glenoid, and the capsule was thicker and less compliant than in other shoulder conditions. The blunt trocar and sheath were carefully introduced angling toward the biceps origin to prevent joint surface damage. Intra-articular placement was confirmed by fluid backflow through the sheath. Visualization of the contracted synovitic arthroscopic triangle between the long head of biceps, the upper surface of the subscapularis, and the glenoid rim provided orientation. A spinal needle was placed anteriorly just lateral to the coracoid tip, into the arthroscopic triangle and was seen with the arthroscope. A smooth 7-mm cannula was then placed. A gelatinous, proliferative synovial material at the root of the biceps, over the rotator cuff interval, and typically down the anterior capsule into the axillary pouch was debrided with a motorized shaver. As much synovial hyperplasia as could easily be debrided.

The capsular release began with the rotator cuff interval. At this point, the cannula was removed anteriorly, and a 3.0-mm 90° under water cutting diathermy probe. was introduced down the track of the cannula and into the joint. The 90° tip allowed us to rotate the instrument and cut into the thickened capsule and back toward the entry point of the instrument. The interval was released along the base of the arthroscopic triangle medially, from the biceps down to the upper subscapularis, paralleling the glenoid rim. Then the cautery was used to release the tissue parallel to the thickened upper border of the subscapularis to allow mobility of the joint to proceed with the capsular release inferiorly. The goal was to create an extra labral capsular release from the glenoid. The subscapularis tendon was not released. To release the inferior capsule, the 90° bipolar diathermy probe tip was oriented up or away from the axillary nerve and placed in the axilla of the capsular release antero-inferiorly. The capsule was released from the inferior glenoid rim and carried down around the 6 o'clock position. The cautery was placed through the posterior portal. The release began over the posterosuperior recess, where the disease can obliterate this recess and tether the supraspinatus tendon to the glenoid rim.



Figure 2: Arthroscopic surgery position.

Posteriorly, muscle fibres of the infraspinatus were seen as the thickened capsule was released. After the complete circumferential release was completed, the shoulder was put through a gentle range of motion with proximal humeral pressure. Typically, there was a small feeling of giving way, rather than the sudden snap or release feeling during traditional manipulations with the subscapularis tendon was now visible and was freely mobile and the arthroscope could navigate easily through the joint. The subacromial space was evaluated in all patients for bleeding. The portals were closed in a routine fashion. The arm was supported in a shoulder immobilizer.

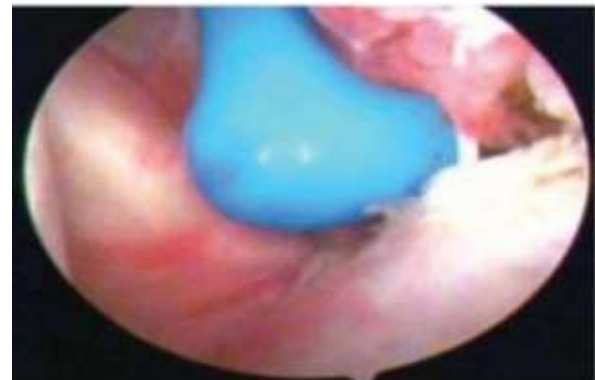


Figure 3: Intra-op image.



Figure 4: Manipulation under anesthesia.

Manipulation of shoulder joint under anaesthesia

Manipulation under anaesthesia was performed under short general anaesthesia, alone or with an additional brachial plexus block. The patient was positioned supine. The pre-manipulation range of motion of the shoulder joint can be measured at this stage. The surgeon should stand at the head end of the table with one hand stabilizing the scapula in resting position, the surgeon's other hand should be placed in the patient's axilla such that the surgeon's forearm is resting against the whole of the inside of the patient's arm, first the shoulder is flexed and adducted this maneuver will rupture the posterior capsule followed by external rotation in adduction followed by

abduction and external rotation this maneuver leads to rupture of inferior capsule followed by internal rotation.

Post operative protocol

Regular dressings with suture removal on post op 15th day. Maximum and immediate shoulder mobilization after surgery to achieve maximum available movements with physiotherapy and scores were assessed using DASH scoring system.⁷⁻²⁴



Figure 5: Post-op movements.

DISABILITIES OF THE ARM, SHOULDER AND HAND					
	NO DIFFICULTY	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	UNABLE
1. Open a light or heavy jar	5	2	0	4	0
2. Write	5	2	0	4	0
3. Turn a key	5	2	0	4	0
4. Fasten a button	5	2	0	4	0
5. Push open a heavy door	5	2	0	4	0
6. Place an object on a shelf above your head	5	2	0	4	0
7. Do heavy household chores (e.g., wash walls, wash floor)	5	2	0	4	0
8. Carry or do your own work	5	2	0	4	0
9. Wash a car	5	2	0	4	0
10. Carry a shopping bag or basket	5	2	0	4	0
11. Carry a heavy object over 10 lbs.	5	2	0	4	0
12. Change a lightbulb/coverhead	5	2	0	4	0
13. Wash or blow-dry your hair	5	2	0	4	0
14. Wash your back	5	2	0	4	0
15. Put on a pull-over sweater	5	2	0	4	0
16. Use a screw or nail drill	5	2	0	4	0
17. Recreational activities which require little effort (e.g., swimming, walking, etc.)	5	2	0	4	0
18. Recreational activities which require more force or impact through arms, shoulder or hand (e.g., golf, tennis, etc.)	5	2	0	4	0
19. Recreational activities which require your own hands (e.g., playing tennis, basketball, etc.)	5	2	0	4	0
20. Manage transportation needs (getting from one place to another)	5	2	0	4	0
21. Usual activities	5	2	0	4	0

Figure 6: DASH score system.²³

RESULTS

Total of 30 cases were studied with adhesive capsulitis with 15 cases in each group treated with arthroscopic release and 15 cases with manipulation under GA. There were 20 females and 10 male patients (Figure 7) with mostly right-side involvement (Figure 8). Average age is near 50's (Figure 8). Cases were followed for a minimum 12 months. All patients were followed up at 2nd, 4th and 6th weeks followed by 3rd month, 6th month and 12th month and were assessed clinically, radiologically and functionally by DASH scoring system. Maximum cases

showed good results in arthroscopic group with good functional mobility post operatively compared to manipulation under GA.

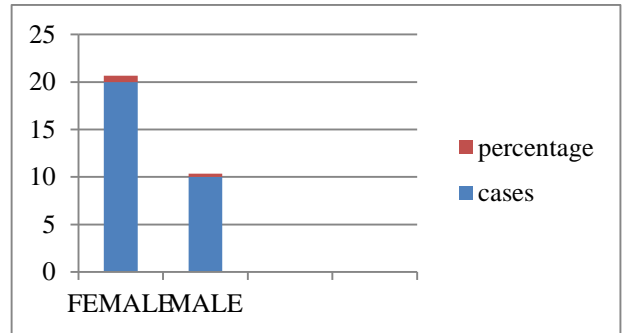


Figure 7: Sex distribution.

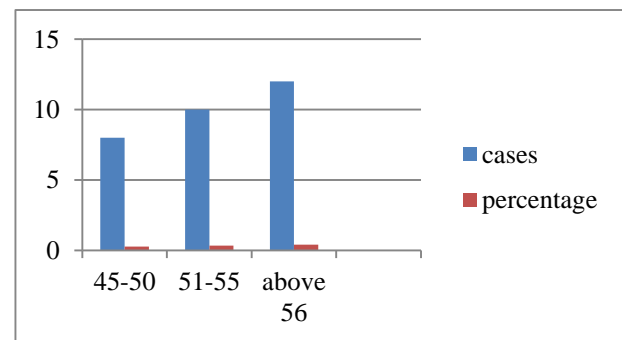


Figure 8: Age distribution.

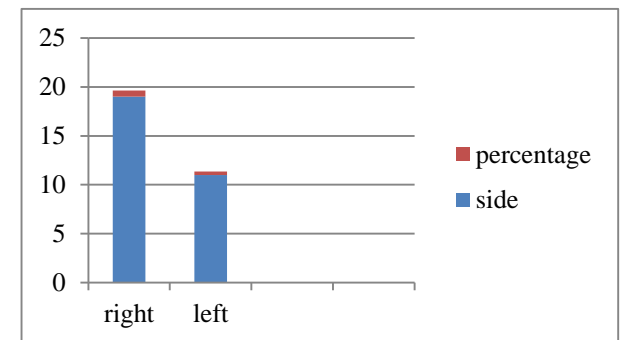


Figure 9: Side effected.

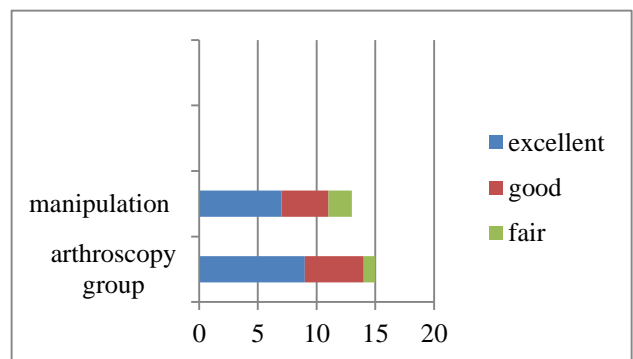


Figure 10: Functional results.

Arthroscopic release showed excellent in 9 patients (60%), good in 5(33.3%) and fair in 1 patient (3.3%) with DASH score standard deviation is 5.87 (Figure 10-11). Average time duration for surgery was 70 mins.

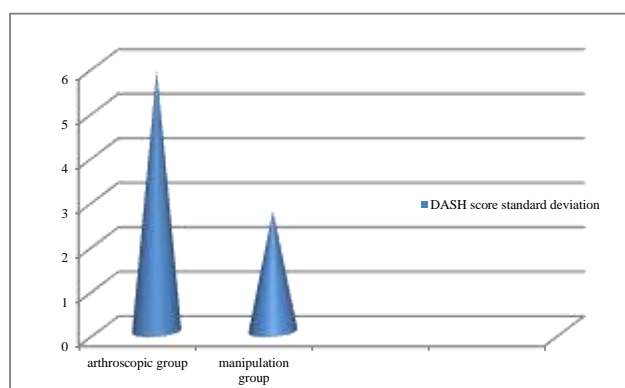


Figure 11: DASH score standard deviation score (p value=0.0158).

DISCUSSION

The treatment of frozen shoulder is challenging not only for the patients but also for the surgeons to get painless, functional shoulder. Pain can be reduced by analgesics preferably NSAIDs, narcotics and Intra articular steroid injections¹. The restoration of shoulder movements is still not achievable in many cases even after conservative management². The recent advanced technique like arthroscopic capsular release of the shoulder is showing good results and proves to be the treatment of choice with the advantage of visualising the intra articular adhesions and releasing them appropriately thereby improving the postoperative pain free range of motion.³⁻⁵ Manipulation Under Anaesthesia, is a fairly uncontrollable procedure but in early stages.^{6,7} In conservative management we cannot see what is released, or torn within or around the shoulder joint.⁸⁻¹⁰ The potential risks of Manipulation Under Anaesthesia are also common due to complications like fractures.¹¹⁻¹³ Significant osteopenia can be considered as a relative contra indication to Manipulation Under Anaesthesia.^{14,15} Although a lot of articles address the risk of a humeral fracture and the use of a short lever arm is emphasized, the complication itself is seldom reported.^{16,17} An evident advantage of manipulation under anaesthesia in comparison to arthroscopic capsular release is that it is more time efficient and that it is associated with substantial lower costs. Proponents of the ACR procedure believe that a complete release of the capsule can be achieved in a more controlled way.¹⁸⁻²⁰ Associated intra-articular pathology can be identified and treated simultaneous. Different from manipulation under anaesthesia, arthroscopic capsular Release can be a more technical demanding procedure. The postop dash score mean for arthroscopic release is 18.66 and standard deviation is 5.8, the postop dash score mean for manipulation under anaesthesia is 27.48 and standard deviation is 2.7 that means the improvement in range of motion and pain by 6 weeks is better with

arthroscopic release than manipulation under anaesthesia.²¹⁻²³ In this study there were few limitations like the rare adverse effects of manipulation may have not been fully assessed due to small size and short duration, and therefore it has become difficult in assessing the adverse effects. Most of the patients were from low socio-economic status and into hard labour work, where follow up was difficult and post-surgery patients used to continue hard labour work which will limit desired results.

CONCLUSION

The arthroscopic capsular release of shoulder joint in adhesive capsulitis was found to have a better functional outcome as compared to the manipulation of shoulder joint under anaesthesia. Currently no treatment protocols are universally effective which needs more and more research and developments for proper treatment strategies. Morbidity with this condition has caused significant loss both economically and psychologically.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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